

In the claims:

1 - 27. (Canceled)

28. (Previously presented) A pierce nut installation apparatus for installing pierce nuts into a panel, each pierce nut having a bore disposed therethrough, comprising:

a pierce nut installation head having a plunger passage for receiving a pierce nut for installation into the panel;

a plunger reciprocating in said plunger passage having a proximal end driving the pierce nuts through said plunger passage into the panel piercing a slug from the panel thereby forming an opening in the panel and installing the pierce nut into the opening in the panel left by the slug;

said plunger having an axial opening telescopically receiving a slug probe rod resiliently biased toward said proximal end of said plunger and extending beyond said proximal end of said plunger through the bore disposed in said pierce nut thereby ensuring the slug is pierced from the panel; and

a slug sensor located beneath the panel for sensing if the slug has been pierced from the panel and has been ejected from said pierce nut installation apparatus.

29. (Previously presented) The apparatus as set forth in claim 28, including a die button disposed beneath said plunger, said die button having an annular opening for receiving the slug pierced from the panel.

30. (Previously presented) The apparatus as set forth in claim 29, wherein said slug sensor is disposed below said proximal end of said plunger.

31. (Previously presented) The apparatus as set forth in claim 30, wherein said slug sensor is located proximate said die button.

32. (Previously presented) The apparatus as set forth in claim 28, wherein said slug sensor comprises an electric current sensor having a signal interrupted by the presence of a slug.

33. (Previously presented) The apparatus as set forth in claim 31, wherein said die button shields said slug sensor from the slug passing through said plunger passage.

34. (Previously presented) The apparatus as set forth in claim 29, wherein said slug sensor is mounted in a tube being coaxially aligned with said die button.

35. (Previously presented) The apparatus as set forth in claim 34, wherein said slug sensor comprises a ring sensor and said ring is coaxially aligned with said die button.

36. (Previously presented) The apparatus as set forth in claim 34, wherein said slug sensor is conductive generating a magnetic field to identify the presence of a slug.

37. (Previously presented) The apparatus as set forth in claim 28, wherein said slug probe rod is biased with a spring.

38. (Previously presented) A pierce nut installation tool for installing a pierce nut into a panel, comprising:

an upper installation assembly spaced above a lower installation assembly for receiving the panel therebetween;

said upper installation assembly having a plunger with a proximal end reciprocating toward the panel for driving the pierce nut into the panel and said lower

installation assembly having a die button cooperating with said proximal end of said plunger to pierce a slug from the panel into said lower installation assembly thereby forming a hole in the panel and plastically deforming the panel and fastening the pierce nut to the panel;

an ejector interacting with the slug pierced from the panel thereby ejecting the slug from said lower installation assembly; and

a sensor disposed at said lower installation assembly for sensing if the slug has been ejected from said lower installation assembly by detecting the presence of the slug being ejected from said lower installation assembly.

39. (Currently amended) A pierce nut installation tool for installing a pierce nut into a panel, comprising:

an upper installation assembly spaced above a lower installation assembly for receiving the panel therebetween;

said upper installation assembly having a plunger with a proximal end reciprocating toward the panel for driving the pierce nut into the panel and said lower installation assembly having a die button cooperating with said proximal end of said plunger to pierce a slug from the panel into said lower installation assembly thereby forming a hole in the panel and plastically deforming the panel and fastening the pierce nut to the panel;

an ejector interacting with the slug pierced from the panel thereby ejecting the slug from said lower installation assembly ~~The apparatus as set forth in claim 38,~~ wherein said ejector comprises a slug rod telescopically articulating from said proximal end of said plunger thereby driving the slug from the hole formed in the panel; and

a sensor disposed at said lower installation assembly for sensing if the slug has been ejected from said lower installation assembly by detecting the presence of the slug being ejected from said lower installation assembly.

40. (Previously presented) The apparatus as set forth in claim 38, wherein said slug sensor comprises a ring sensor through which the slug passes.

41. (Previously presented) The apparatus as set forth in claim 40, wherein said slug sensor is conductive generating a magnetic field to identify the presence of a slug.

42. (Canceled)

43. (Previously presented) The apparatus as set forth in claim 38, wherein said ejector is biased in a downwardly direction by a spring force.

44. (Previously presented) The assembly as set forth in claim 38, wherein said sensor comprises an electromagnetic sensor defining a sensor aperture therein.

45. (Currently amended) The assembly as set forth in claim 38, wherein said sensor signals an alarm [[in]] when a slug has not been sensed in cooperation with said plunger reciprocating for driving the pierce nut into the panel.

46. (Previously presented) The assembly as set forth in claim 45, wherein said sensor is shielded from contact with said slug passing through said sensor.

47. (Currently amended) A pierce nut installation tool for installing a pierce nut into a panel, comprising:

an upper installation assembly spaced above a lower installation assembly for receiving the panel therebetween;

said upper installation assembly having a plunger with an axial opening and a proximal end reciprocating toward the panel for driving the pierce nut into the panel and said lower installation assembly having a die button cooperating with said

proximal end of said plunger to pierce a slug from the panel into said lower installation assembly thereby forming a hole in the panel and plastically deforming the panel and fastening the pierce nut to the panel;

an ejector interacting with the slug pierced from the panel thereby ejecting the slug from said lower installation assembly ~~The assembly as set forth in claim 38,~~
wherein ~~said plunger includes an axial opening and~~ said ejector comprises a slug rod telescopically extending beyond said proximal end of said plunger for forcing the slug pierced from the panel through said lower installation assembly; and

a sensor disposed at said lower installation assembly for sensing if the slug has been ejected from said lower installation assembly by detecting the presence of the slug being ejected from said lower installation assembly.